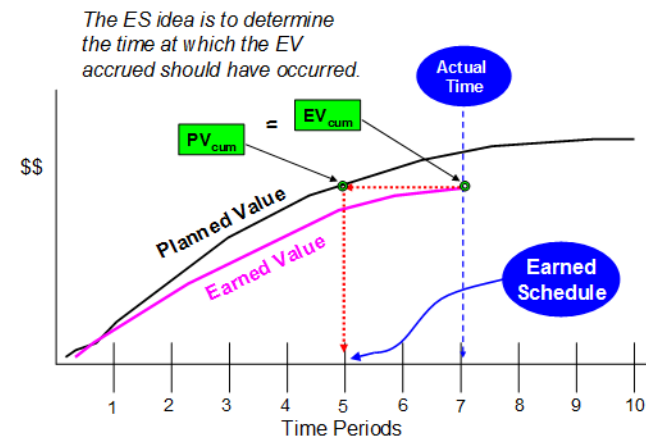




MEASUREMENT

WHO NEEDS IT?!!

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Abstract

There are many elements to a project ... requirements, schedule, cost, quality, human resources, communications, risk, procurement, and... Every project is complex and extremely difficult to manage to successful completion, even those considered “small.” The majority of the life of a project occurs during its execution. Although the execution phase is preponderant, there doesn’t seem to be much emphasis on it. The literature, the training, professional meetings, and conferences do not commit proportionate energy to methods and techniques to prepare project managers for monitoring and reporting performance. Neither do these venues for knowledge transference bring focus to addressing performance measures and indicators, or using them for controlling the project. This presentation examines the assertion and proposes the application of Earned Value Management and its extension, Earned Schedule, as a way forward.



“I DON’T HAVE TIME TO PLAN
...I HAVE WORK TO DO!!”



“I DON’T NEED MEASURES
...I KNOW MY PROJECT”



Overview

- Introduction
- Quality Culture
- Improving the Practice
- The Way Forward
- Summary

SPC

Shewhart
Deming
Crosby
Juran
Humphrey

PMBOK

OPM3

SEI

EVM
& ES



INTRODUCTION



Introduction

- ~1980 → Present - significant evolution in quality, software development, and project management
 - Strongly connected to quality experts and world events over 70 yrs
- WWII made the U.S. the predominant industrial nation
 - Quality was of little concern
 - Market decline beginning ~1970
- Post war Japan – business leaders adopted U.S. manufacturing practices used before & during war
- Most notably quality methods were taught by W. Edwards Deming ...*economic growth would come from the methods created by Walter Shewhart*



Introduction

- During the 1980s Japanese automobiles began making inroads into the U.S. market
- The alarming wake-up to U.S. manufacturers began the quality revolution – *no longer was quality perceived as an expendable portion of the production process*
 - Deming seminars and videos were commonplace
 - “Red Bead” experiment taught natural variation
- Significantly, SPC was taught, learned, and implemented – *yielding the pathway to process control and continuous improvement*



Introduction

- With increased focus on quality, Deming introduced the concept of *Profound Knowledge*
 - Deep understanding of the company & products comes from years of experience and progression within the organization
 - Profound Knowledge cannot be achieved by job hopping managers and employees
- Deming, in his denigrating manner, would say – “*How can you improve if you don’t know what you are doing?*”



Introduction

- Other notable influences in the quality revolution ...
- Joseph Juran – *education and training of management, and human relations problem of resistance to change ...introduced idea of ‘Pareto Principle’*
- Philip Crosby – *his book, Quality is Free, made the business case for a good quality systemput forth the Quality Management Maturity Grid – 5 evolutionary stages providing a template for understanding and improving*



QUALITY CULTURE



Quality Culture

- The startling success of the Japanese, loss of U.S. market share and other project failures, created the impetus for dramatic change
- New terminology emerged to describe an abrupt shift from present business practice and culture ...today those involved with quality and improvement commonly use the term, *Paradigm Shift*
- Out of the desperate desire to improve and the recognition that quality was the pathway came ...
Software Engineering Institute – 1984
Project Management Body of Knowledge – 1987



Quality Culture

- The U.S. government to increase emphasis for embracing quality established the *Malcolm Baldrige National Quality Award*
 - Seven areas of excellence – *Leadership, Strategic Planning, Customer Focus, Measurement/Analysis/Knowledge Management, Workforce Focus, Process Management, Demonstrable Results*
- SEI's contribution – the Capability Maturity Model, CMM®
 - Adapted Crosby's grid to a staged improvement model for software development – *Initial, Managed, Defined, Quantitatively Managed, Optimizing*
 - Evidence supports the assertion that software providers at CMM® levels 4 & 5 are more likely to deliver products satisfying the customer requirements



Quality Culture

- The *PMBOK* is the recognized embodiment of the knowledge and practice of project management
...presented as activities for 9 knowledge areas {integration, scope, time, cost, quality, human resource, communications, risk, procurement}
...occurring over 5 life phases {initiation, planning, executing, monitoring & controlling, closing}
- The PMI® quality improvement strategy – standardize the methods, certify managers through PMP examination
...Voila! Improvement!!
 - By increasing the number of PMs knowledgeable of best practices a growing percentage of projects should complete with good quality, delivered on time, and within budget



Quality Culture

- SEI & PMI® have the same objectives of institutionalizing quality in organization, process, and product, but ...
 - PMBOK unclear about organizational standard processes
 - CMM® seeks data driven continuous improvement
- Without organizational standard processes and emphasis on the use of data, the PMI® approach is limiting
 - Satisfying the *PMBOK* achieves Level 2, possibly Level 3 of CMM®
 - Lack of emphasis on controlling defect propagation, little concern for controlling anomalous behavior, reducing variation, or continuous improvement



Quality Culture

- Extrapolating from the *PMBOK*, the environment surrounding project management implicitly indicates best practice is ...

Experience & Intuition



Quality Culture

- Doesn't it make sense for managers to be as well informed as possible concerning their project's performance?
- Doesn't it also seem reasonable that better informed decisions increase the probability of a successful project outcome?
- What is the basis for systemic improvement when measures and indicators are not ingrained in the organizational culture?



Quality Culture

- Regarding process improvement ...
 - *How is it known an improvement is needed?*
 - *How can management know if improvement is achieved when there is no or scanty evidence of how the present process performs or the quality of its products?*
 - *When measurement and analysis is not common practice, there is low need for the application of knowledge management for improving project planning and understanding long term process improvement and performance drift*



IMPROVING THE PRACTICE



Improving the Practice

- The message to this point is obvious...

The PMBOK establishes a standard for best practice, but does not promote a culture of continuous improvement

- Unlike the CMM®, there is no assessment to see if the best practices of the *PMBOK* are implemented and performed well
 - Without having an understanding of whether or not best practices are used, how can success or failure of a project be evaluated?
 - How can the organization improve its methods and policy, thereby providing an environment where projects are delivered successfully, waste is reduced, and business flourishes?



Improving the Practice

- The methodology intended to fill this void is the ...

Organizational Project Management Maturity Model,
more commonly termed “*OPM3*”

- The project management model for improvement was issued initially in October 2003 and was later updated in December 2008 to align with the fourth edition of the *PMBOK*
- *OPM3* is a best practice standard for assessing and developing project management capability
- It is an approach for understanding project management behavior and bringing focus to areas of performance needing improvement



Improving the Practice

- OPM3 is a staged model similar to the CMM® ...
 - 1) *Standardize*
 - 2) *Measure*
 - 3) *Control*
 - 4) *Continuously Improve*

The process characterization for each of these four stages is very much the same as those for the software model. Initially, the organizational processes are standardized. Once standardization is in place, measurement of the process can proceed. Having measures in place, controlling and subsequently improving the process become possible.



Improving the Practice

- The *OPM3* project domain framework identifies 9 process areas that show correspondence between *PMBOK* processes and *OPM3* best practices
- Of the 44 *PMBOK* processes within the 9 areas, only 4 directly relate to project execution: schedule control, cost control, quality control, and risk monitoring and control
- Because execution utilizes the most project resources over the longest phase of the project ...

Shouldn't it then be appropriate to discuss in detail the methods and tools for these important control processes?



Improving the Practice

- *Measure* is an important stage in the *OPM3* approach to improvement, but there is minimal guidance for what constitutes its successful achievement
- *OPM3* does describe the characteristics of measures, but to progress and advance to the *Control* and *Continuously Improve* stages something more specific would be helpful



THE WAY FORWARD

EVM

IES



The Way Forward

- The importance of Measurement ...

“In physical science the first essential step in the direction of learning any subject is to find principles of numerical reckoning and practicable methods for measuring some quality connected with it. I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the state of Science, whatever the matter may be.”

- Lord Kelvin



The Way Forward

- When a project manager does not have objective measures of performance for cost and schedule, he/she cannot react intelligently and, consequently, has little chance of guiding the project to successful completion
- Under these circumstances, the manager has only his/her personal knowledge and intuition as a basis for action



The Way Forward

- EVM is mentioned only briefly in the *PMBOK* as a “Tool and Technique” for controlling cost and schedule performance
- *OPM3* identifies the performance measures and indicators from EVM as merely an approach to be considered for satisfying the Measure stage of project management improvement



The Way Forward

- My contention - *The power and usefulness of the EVM management methodology has not been exploited to the degree it should*
- And furthermore - *The lack of emphasis from the PMBOK & OPM3, regarding EVM, has slowed the advancement of the project management profession to the “state of Science”*
 - A qualitative description is not enough information for analysis and management action - *objective measures provide the deeper understanding, yielding the capability to formulate reasoned tactics, thereby improving the opportunity for success*



The Way Forward

- EVM has existed for ~40 years, about 20 years older than the *PMBOK ...it provides the quantitative measures necessary to advance project management to the “state of Science”*
- EVM has an expansive infrastructure of support ...
 - Standards
 - Textbooks
 - Improvement Model
 - Training
 - Certifications – individual & organization
 - Automation Tools



The Way Forward

- Why isn't the use of EVM more prevalent? ...

The reasons cannot be stated with certainty, but the following is offered as a rational summation for consideration

- EVM was first imposed on U.S. defense contractors in the late 1960s & throughout the 1970s
- The creation of custom EVM systems was not a simple matter
- Computing technology was not sufficiently mature ...it was difficult and expensive to connect time accounting, the project schedule, earned value (work accomplished), and actual costs
- The early EVM systems were likely cumbersome to use and not accurate or reliable, as well



The Way Forward

- EVM has developed the reputation that it is ...
 - ✓ *Terribly complex*
 - ✓ *Difficult to do*
 - ✓ *Overly burdensome to employees and managers*
 - ✓ *Expensive to create and implement*
- With this as the perception, the likelihood of employing EVM is very low ...*it is contended that this attitude persists and is prevalent within the project management community today*



The Way Forward

- This is not the present circumstance, at all ...there is considerable support available ...EVM can be implemented and applied without undue difficulty
- The most troublesome hurdle to implementation is the reporting of earned value; i.e., assessment of project accomplishment
 - Disciplined reporting is a difficult transition to make for most, people and organizations, as well.
 - However, once reporting becomes commonplace, an environment of transparency and accountability is created for everyone involved ...both characteristics are most assuredly desirable outcomes
 - Other implementation hurdles - a desire or requirement to have a sophisticated, or even a certified EVM system



The Way Forward

- The elements prescribed by the *PMBOK* to prepare the project for execution are the necessary ingredients for applying EVM:
 - *Work Breakdown Structure*
 - *Estimates of task cost and duration*
 - *Task sequencing*
 - *Creation of the schedule*
- The additional step of aggregating the information into the Performance Measurement Baseline (PMB) creates the necessary reference for EVM performance analysis



The Way Forward

- The key point is that, when the accepted project management guidance is utilized, taking the next step to employ EVM is not an overwhelming undertaking.
- Inversely, when employing EVM is the organization's standard method of project control and reporting, it encourages and re-enforces *PMBOK* guidance and *OPM3* best practice
- Additionally, once implemented, EVM greatly facilitates improvement to project management practice, and thereby promotes achievement of the higher levels of *OPM3: Measure, Control, and Continuous Improvement*



The Way Forward

- EVM has a primary focus on the cost performance, but does have indicators for assessing schedule performance
- However, these schedule indicators are limited in usefulness due to their flawed behavior for late performing projects
- To overcome this deficiency, Earned Schedule (ES) was created in 2003
- ES extends EVM and provides reliable analysis of the schedule performance ...*together, EVM and ES provide incredible capability for measuring and analyzing project performance*



The Way Forward

- EVM - *present cost performance status, forecast final cost, future performance necessary to meet the cost objective*
- ES - *report status, forecast completion, critical path analysis, future performance for achieving the desired completion date ...schedule adherence - identify constraints, impediments, potential areas of rework, forecast rework, and reveal 'EV gaming'*
- Together, EVM and ES provide project managers the capability to develop integrated tactics when recovery is needed



The Way Forward

- The point should be clear

The numerical methods inherent with EVM and ES provide the ingredients to propel project management to the “state of Science.”

- Beyond monitoring and controlling, the numerical data contribute to creating a project archive
 - The execution history, aggregated with other project documents, form a complete project record
 - Formalized project records promote making the data useful for ...planning of new projects, analysis of improvement initiatives
 - As a natural consequence, without emphasis, the organization will gravitate to the employment of *Knowledge Management*



The Way Forward

- Through the use of EVM with ES, the argument is made that project performance will improve as well as the organizational practice
 - The numerical evidence of performance with the accompanying analysis capability, as a result of their application, provides primary input to the achievement of the higher levels of *OPM3*.
 - Performance measures are available for stage 2 (Measure)
 - Analysis of the measures and derived indicators yield methods of project control necessary to achieve stage 3 (Control)
 - The application of knowledge management facilitates the accomplishment of stage 4 (Continuous Improvement)



The Way Forward

A Quantum Advance for
project management is readily available through
EVM and its ES extension



SUMMARY



Summary

- Quality concerns in the 1980s became the driving force for product and process improvement
 - Derived from the initial work of Walter Shewhart
 - Subsequent evolutions contributed by Deming, Juran, and Crosby
 - Building on the significant work of these men, Humphrey and the SEI formalized the quality system for application to software development
 - Subsequently, PMI adapted the ideas and concepts from the SEI to project management



Summary

- Embodiment of quality for project management – *PMBOK*
- Methodology for improvement of practice – *OPM3*
- EVM & ES insufficiently emphasized by PMI® documents
- Implementing EVM and ES is encouraged and shown to reinforce good practice and support quality
- Expectation is improvement in project performance, while advancing and maturing organizational behavior



The State of Science



The application of the system of measures and analysis methods from **EVM** and **ES** advances project management to the “state of Science”

And ultimately, achieving this state leads to **Knowledge Management and Continuous Improvement**



Thank You!!

TM